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The Director of Central Intelligence
Washington, D.C. 20505

Intelligence Research and Development Council

IR&DC 88-0036
12 October 1988

MEMORANDUM FOR: Robert M. Gates
Deputy Director of Central Intelligence

25X1 SUBJECT: Optical Computing []

1. The attached report is in response to your tasking last year for the Council to undertake a technical assessment to determine the current status of technology developments toward the development of optical computing devices as well as what may be expected in the future. [] Assistant Deputy Director for Research and Engineering (Technology) of the National Security Agency, was asked to provide for the studies completion and Dr. [] of the NSA's Research and Engineering Organization was asked to chair a community task force to undertake the study. []

2. Optical computing is information processing (analog or digital) implemented with optical techniques. The task force formed to assess optical computing included members from CIA, DARPA, HDL, NASA, NISC and NSA. Several members had extensive optical computing experience. In addition the task force (as a group or individually) interviewed recognized authorities, attended meetings and presentations, examined pertinent literature, and made facility visits. []

3. The task force found that optical computing techniques offer unique features, including parallelism, global connectivity, and non-interaction photons. Analog optical processors are fielded now, due largely to intelligence community efforts. They solve processing requirements intractable by conventional techniques. Problem areas include lack of communication, non-standardization of systems, and limited component capabilities. As such problems are resolved, the use of analog optical computing techniques will expand. Optical technology provides interconnects and memory for conventional digital computing. Regarding all-optical digital computing the optical transistor (switch) now appears to be a reality. Intensive efforts are devoted to implementing special purpose digital optical systems, they will provide the intelligence community with components and techniques of considerable utility. The task force was not convinced a general purpose all-optical digital computer will result. []

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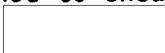
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4. The task force concluded that optical computing techniques will play an increasingly important role for the intelligence community. The development of standardized optical computing systems, and more widespread knowledge of their capabilities would facilitate their application. Communication within the intelligence community regarding optical computing efforts is poor and security restrictions have had a negative impact on the availability of external capabilities in optical computing. The intelligence community needs outside assistance to ensure adequate exploitation of the abilities of optical computing.

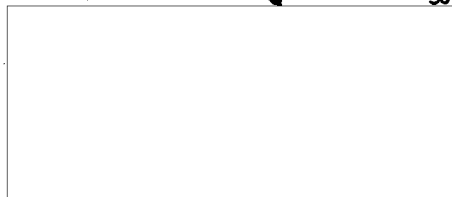
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5. Therefore, the task force has recommended that I establish a optical technology steering group which will report regularly to the Council regarding the evolving status of optical technology and also serve as a focal point for continuing communications within the Intelligence Community regarding technology progress. I believe this will be of value and therefore intend to form a steering group which is concerned with this evolving technology.

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Chairman

Attachment

Optical Computing Report (SC007139-88)

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